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APPLICATION OF COMPREHENSIVE
PLANNING TO THE URBAN TEACHING
MEDICAL CENTER



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Application of comprehensive planning to the urban teaching medical center

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by HERMANN H. FIELD

DURING the past four years, long-range development planning has been carried on at the Tufts-New England Medical Center as a continuing inhospital operation, rather than with outside consultant service as is more commonly done.

Planning an urban teaching medical center presents the most complex problems in one of the most complex of contemporary planning and design areas, that of hospital facilities. Richard Llewellyn-Davies, the British architect who fathered the unique Nuffield hospital planning studies¹ during the 1950s and who has become one of the most thoughtful and far-sighted planners in this field, recently remarked:²

"I think if we are honest with ourselves most of us who have planned hospitals would say, when we have finished a major project, that we still feel that we have not really as architects mastered the social, architectural, and technical problems that are involved. I

Long-range planning carried on as a continuing inhospital operation at a large urban teaching medical center is described by the author. He enumerates the many factors that make planning for this multifaceted facility unusually complex and discusses four contexts which give direction to the planning intervention.

know that is true of me, with one exception. There is one hospital with which I have been concerned which I feel is all right. This is the eight-bed hospital which I built for the 2000 population of the island of Alderney. . . . Beyond that scale I am not at all satisfied with what I have done, and I think this is a measure of the deep complexity and social and architectural difficulty of hospital architecture."

What Lord Llewellyn-Davies is pointing to is our failure to come to grips in any real sense with our assignment. The failure is compounded by the fact that in this field we are confronted with a social organism in the process of many-faceted change, and that we go at our problem solving with essentially primitive tools and static attitudes that cannot hope to do the job. This is not meant to

imply that designers in the hospital field are singularly "hamhanded." Generally, the environmental planner today finds himself at the center of unprecedented change which places emphasis on sophistication. Yet his profession is only just emerging from its infancy. Certainly, in the broader area of urban planning the inadequacy so far has been monumental. In contrast, medical facilities can usually be perceived as specific building entities, but they are not therefore simpler. In fact, in many respects a hospital setting is a microcosm of its larger surrounding urban area in all its complexity. Or more specifically, the difficulties of planning health facilities are a reflection of present stresses in medical care and in the practice of medicine, which in turn are a part of the innovative crisis of contemporary life itself.

REALITIES OF PLANNING

First, a brief look should be taken at the reality confronting planners as it relates to medical care. Concepts of medical care that have grown up were until comparatively recently—say the end of World War II—fairly well defined and predictable on the basis

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of patterns that took shape mainly in the late 19th Century. After that, improving medical care was a matter of growth and refinement, of doing the same things better for more people within essentially the same organizational and conceptual framework. In contrast, over the last decades medical care has been swept along ever more rapidly in the vortex of the scientific revolution. As a result, simple growth and improvement have surrendered to change, accelerating change at many interacting levels. Here are some examples:

1. In medicine itself, there has been an almost complete elimination of major traditional disease entities that once required hospitalization and that were form givers for layout, organization, bed ratios, and so forth.

2. As a corollary to this, entirely new types of medical intervention have been introduced where none were possible before. These involve highly sophisticated techniques and hardware, which have hastened the breakup of the traditional hospital elements and increased the shift from direct patient care to ever more elaborate supportive services.

3. The gradual disappearance of the concept of outpatient care for the indigent, or even medically indigent, in favor of the paying ambulant service, coupled with the growing desirability to keep patients on their feet rather than in the hospital bed, suggests a new centrality and entirely new forms for the handling of ambulant and home care patients.

4. The continual reduction of disease during the middle years has increased the concentration on childhood illnesses and the chronic and debilitating diseases of old age, which formerly were peripheral to the hospital setting. Even stronger in its impact on the age distribution trends of hospital patients is the general population explosion and the huge increase of persons in the over-65 sector.

5. On the technological side, there is the ever-growing enlistment of machines not only in the peripheral, supportive services as at first, but also in direct patient care itself. Examples are the computerizing of record handling, of prescription handling, and the increasing application of automated

patient monitoring. Tools such as heart-pump machines and artificial kidneys are adding their effects.

6. The medical demands of an affluent society are continuously rising and have shifted from an expectation of minimal cure and relief to one of overall health maintenance and an emphasis on the human quality in its broadest sense.

7. In the economics of medical care, third-party support has created a radically different financial structure and increased the utilization of hospitals. Just around the corner is the concept of comprehensive, prepaid care in some form with the hospital, rather than the isolated practitioner's office, as the logical center for such care.

8. And on top of all this, there are the trends toward inner urban renewal and repopulation and the pulling together of all community resources, with health maintenance and medical care continuity becoming an increasing social responsibility.

These examples, and there are many others, make it amply clear that the hospital planner is not faced with a single factor of change but with multiple changes occurring at varying paces.

THE TEACHING MEDICAL CENTER

In addition to these factors relating primarily to patient care, in the teaching medical center there are the elements of education and research to compound the difficulties of planning. Here, the planner is faced with two further burgeoning worlds of change, which do not simply form two legs of a neat three-legged medical-center stool. To be effective, each of these two elements must reach deeply into the patient care structure of the institutions. In this intermeshing, research especially plays havoc with any neat systematization. It is completely erratic in its needs and unpredictable both in quantitative growth and in direction, demanding a degree of open-endedness difficult to fit into organized long-term development. This is especially trying if the institution happens to be locked in an urban web with its own counterpressures and flux. By every indication, teaching medical centers will increasingly be situated at the core

of the social interaction and the communications network, rather than in outlying areas.

THE GENERALIST PLANNER

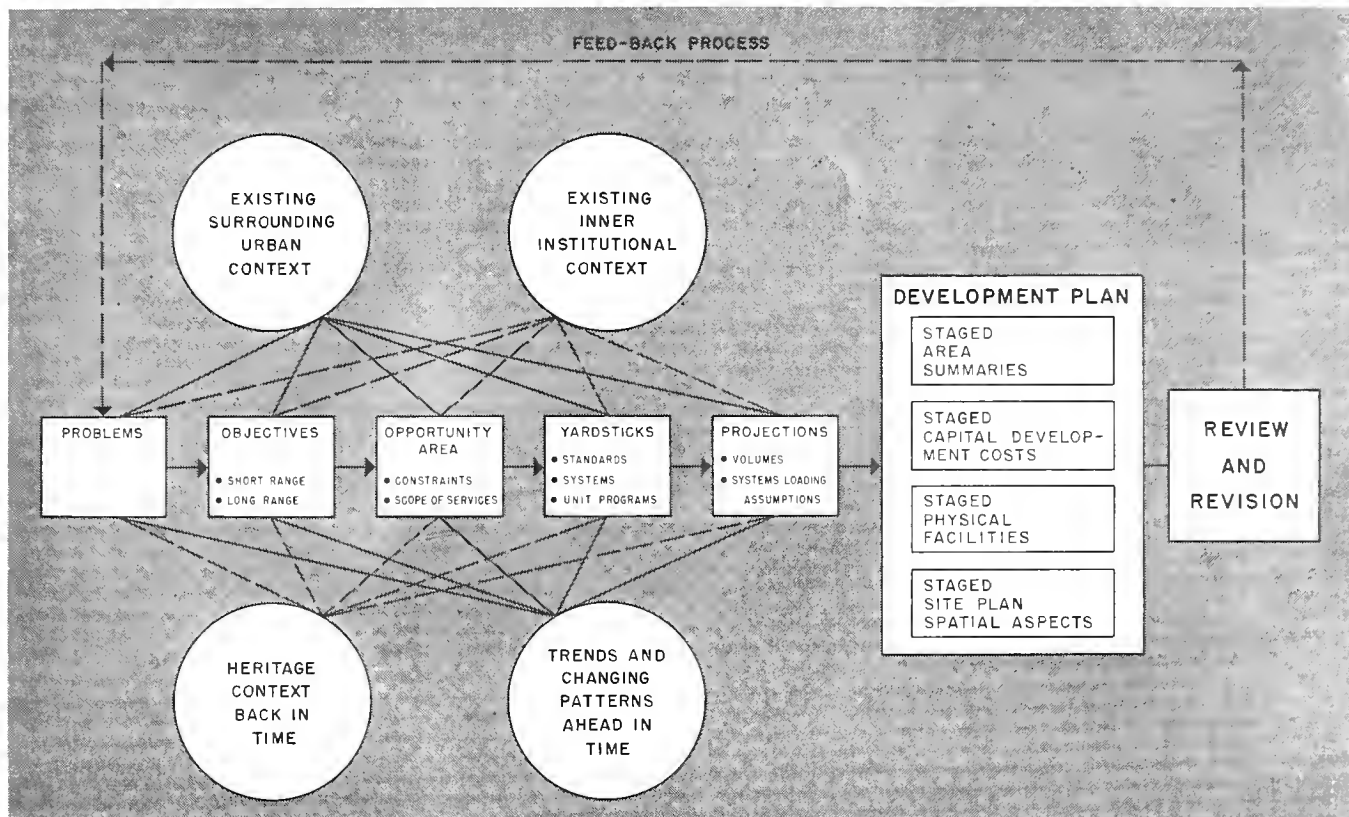
It is clear that hospital modernization and development cannot be carried out as an isolated intervention to meet specific pressures. Instead, it must anticipate a continuity of change involving a broad range of planning disciplines. It will not succeed if the effort represents a narrowing process, which leads only to fragmentation, the bane of all contemporary problem solving. Unfortunately, too many planning efforts are still concentrated on specialization and on the specialty within the specialty within the specialty, losing thereby a concept of the total organism. If planning for these specialties is allowed to become an end in itself rather than a means to a more complex human end, designers will continue being trapped by gadgetry and fads—the present vogue for the circular hospital is an example.

It appears that a generalist planner is what the current situation calls for. This has been the approach used in the work at the Tufts-New England Medical Center. It is pragmatic, free wheeling, frankly searching, never simple, and with a high threshold of tolerance for uncertainty. A closer look at this approach may help to clarify it.

THE PLANNING CONTEXTS

The setting for our hospital planning was visualized as a kind of four-ring circus, with each act commanding continuing attention. These four rings represent four planning contexts, which can be identified as (1) the existing surrounding urban context, (2) the existing inner institutional context, (3) the heritage context, and (4) the context of change. The first two are static, the second two are related to time. Together and in balance, they provide the raw material for the planning intervention. The quality of the end product will depend largely upon the quality of the understanding of these contexts.

The existing surrounding urban context. The hospital being considered here is not isolated in some remote region, but is involved with



Planning path (Tufts-New England Medical Center planning office)

an intricate environment and is serving something in that environment which must be accurately defined, for that something forms its reason for existence and gives it its specific character and function. In a community hospital, what is being served primarily is the population of a single surrounding geographic area. At the other extreme, in a teaching medical center, a series of specific population entities of different scales and geographic distribution is most likely being served; and these are related to referral patterns and to the institution's teaching role.

Beyond the medical service relationships, there is the physical setting of the institution and its human environment, which must be considered. Very commonly the hospital is found in the ambivalent position of treating the community's sick while acting as if the community itself did not exist. This results all too frequently in the hospital's becoming a contributory source of neighborhood decline. The large teaching hospital complex traditionally has been a self-involved island with its back turned to its neighborhood. Not only is this tradition short-sighted

in not recognizing its negative side effects upon the institution itself, but it is also short-sighted in terms of the future, for it runs counter to the growing expectation of health maintenance as an integral community function in an affluent and humanistic society.

Thus, the hospital planner must base his approach at every stage on plans that will lead from this negative past to an active neighborhood involvement. This can be done only by making the institution's external medical service relationships and its place in the surrounding community an integral part of the overall planning strategy.

The existing inner institutional context. Of course, the hospital itself in all its manifestations is the primary planning concern. But it is just here that much of the failure has its starting point. Envisioning the hospital as a static collection of facilities, spaces, and operational volume figures is too superficial. Of course, a careful inventory of the existing plant and its human component—patients, medical staff, personnel, students, etc.—is essential. So are the economics of the hospital's operations and the identification of apparent

problem areas. But with this must go a comprehension of the operational and social systems which make everything hang together and function better or worse. This involves the enlistment of very special know-how, which no amount of architectural intuition or word of mouth can replace. In this sense, the hospital's subsystems and their interactions must be taken apart and analyzed in as much detail as the hospital's physical and human capacity.

The heritage context: back in time. Except in the comparatively rare case of an entirely new institution in an isolated setting, each institution and its neighborhood have traveled a particular road for better or worse. It is in its history that the clues to the institution's real identity will be found—its special flavor, its loyal following, and, if properly exploited, much of its potential for the future. When planning in the midst of sweeping change, one is always in danger of losing the human dimension.

Even a name that no longer applies, but has a long association in people's minds, may be a valid guidepost for the future. For example, one of the component units of our medical center has the quaint

name, the Boston Floating Hospital. This is not because it floats on piles in filled-in bays as most of Boston does, but because, until it burned down over a quarter of a century ago, it actually did float as a boat daily pushing out into the harbor in search of good air and an enforced environmental isolation as a cure for infant diarrhea among children of indigent families. This was the somewhat unscientific idea of Boston do-gooders of another period, but in the process it became an early experiment in the concept of the day-hospital and also in parental participation, a recurrent theme in our present planning for this unit. This unusual setting for a hospital also led to the ship's becoming one of the first laboratories for research in formula feeding and a favored spot for internships by many who are now this country's leading older pediatricians. The pioneering impulse of those days has not diminished, and from this presently inadequate facility some of the most promising new planning concepts are emerging. Furthermore, its name, with this strong historic identity, recalls a tradition around which the medical staff, alumni, nursing personnel, and parents can rally—a tradition that would largely be lost if an entirely fresh start were made.

As for the neighborhood, a hospital can do much to strengthen an area's identity with its heritage in the way it handles scale, open spaces, and communication lines, and by the way it reinforces sound traditional activity patterns. Unfortunately, the usual course is just the opposite.

The context of change: ahead in time. This is the most baffling and complex of the four planning contexts and takes the planner into the uncertain world of prognostication. It involves a wide search and an analysis of the many trends in many areas—medical, social, behavioral, economic, technological, and physical. Some of the most important of these are in the area of medical care. It is this context that provides the main ingredients in our battle against both physical and operational obsolescence. Too often directives are left by default of the planner to off-the-cuff judgments of particular trustees, ad-

ministrators, or the medical staff. Although their thinking should be sought and carefully weighed, they are much too close to and too involved in power issues to be a definitive source; their perspectives cannot take the place of independent research and analysis on the broadest possible base.

THE PLANNING PATH

Once it is decided to base planning at every stage on the balanced interplay of these four contexts, it is then necessary to sort out a logical sequential planning path that will enable the planner to put together the mosaic (see Figure, page 50). In doing so, it is important never to lose sight of the overall design intent, to refine it continually as it takes shape in detail in what has been called a strategy of "successive approximation."³ The diagram suggests in a simplified way the main steps of this path and the manner of relating them continually to the four contexts. Let us look at each step in turn, starting at the left.

Problems. Obviously, some pressing problems led to the decision to start on a modernization and development effort. The initial statement may look quite different from the final one, but there always has to be a beginning. It may have been an obviously outdated and crowded plant, a falling census, bed shortage, threat of disaccreditation, a declining public image, a sudden gift of funds, or a dozen other good or bad reasons.

Objectives. With detailed knowledge of the four contexts, a beginning can be made at formulating general and specific long-range goals of the particular institution. These will be both external, relating to the institution and its community, and internal, relating to the scope and character of the hospital's future services. It will also be helpful to distinguish between relatively immediate and the long-term objectives.

Crystallizing the thinking on goals is a slow, often stormy process involving many parties. Ultimately, however, a clear framework, accepted as official policy by both the trustees and medical staff, is essential to the further planning process. Without this firm guide, the cart is put before the horse

and the door is opened to expediency and to fads of the moment. Such a projection of goals has the effect of creating the very conditions to bring them about, what a leading sociologist has called "the self-fulfilling prophecy."⁴ Perhaps the difficulty of making decisions on objectives can be brought home by the experience in our own medical center. After almost four years of planning, we still have consensus only on a relatively few items, and that is on a quite general level.

Opportunity area. After establishing some clarity as to the institution's objectives, the next important step is to begin spelling out the constraints that must be reckoned with, the constants arising out of the four contexts that limit the manner of achieving the goals. Some of these will be hard and fast constraints, such as the existence in Boston of a protected ethnic community in the hospital's most desired growth direction. They may be in the economic area with set limits of available funds. There may be building height restrictions, floor-area ratios, land-use regulations, or existing investments in plant that cannot be scrapped.

However, few constraints turn out to be as absolute as they seem on first encounter. More usually, they are what might be called "soft" constraints, which can be overcome at a price or are relatively fluid and manipulable. For example, there might be a bisecting street that should be diverted or spanned. There might be existing internal operational and organizational characteristics that must be considered or the limitations created by proposed changes in these. Proposed systems of movement or monitoring or servomechanisms might have a problematic impact. The degree of centralization as against open-ended growth that seems called for might be a stumbling block. Verticality as against horizontality might be another one. Then there are the likely financial limitations. The anticipated role of a specific hospital in relation to others serving similar needs might also require special solutions.

This last constraint deserves special mention in that it still usually goes by default. Obviously,

areawide planning of hospitals increasingly will become an integral part of hospital development. In Boston, if anywhere, the huge concentration of medical care, teaching, and research facilities cries for some sort of regional approach, but all efforts to date seem to have failed. So for the present we do the best we can, working out from our own setting, although it is clear that we are meeting only part of our responsibility.

THE SO-CALLED STANDARDS

Yardsticks. The main traditional tools for quantifying needs are the so-called standards. They may be averages based on experience over shorter or longer periods or the result of special studies. They often form the required recommendations of state and federal programs. But they also have strong limitations in the kind of situation that confronts one in long-range hospital planning.

Standards put an undue emphasis on the status quo, on a repetition and refinement that implies a static situation or at best a system of retrospective, corrective change, which in itself is a guarantee of built-in obsolescence. Without denying the usefulness of having standards in the armory of planning tools, one must be concerned when they are regarded as a kind of Bible and result in the proliferation of institutions put together out of standard pieces that bear little relation to specific circumstances and do not exploit specific opportunities. Much more sophisticated yardsticks must be found, and handbook standards must be used only as checkpoints. Appropriate models for operational concepts, for functional interrelationships, and for processing paths should be included, as they are related to the specific institution under study.

In our own case at the Tufts-New England Medical Center, pending broader and more continuous research, we have sought a composite based on all relevant factors we could lay hands on—including current accepted standards. But the emphasis has gone into examining new approaches in each area wherever they may appear, at other institutions, in published studies, or in interchanges

with other investigators or authorities. All this is closely related to the four contexts.

This emphasis is beginning to provide us with a broad yardstick of sorts, backed by varying levels of interdisciplinary data. As an example, take our dental planning. As a unit of measurement, the dental requirements are often stated in square feet per dental chair. A year's study (and it is only the beginning) of our dental teaching and clinical operations have already indicated the complete inapplicability of these current standards. In the first place, they are based on the traditional solo practice operatory. But both the teaching process and changes in dentistry itself, which are now emphasizing the dental team and broader dental intervention than just traditional tooth repair, require very different operational patterns and designs of dental space.

Furthermore, a massive research effort in the dental area is beginning. This demands that a new look be taken at handbook standards and that a yardstick be found that will not impede movements in the very directions they must go. All this takes time and manpower, and since we cannot wait, we make tentative assumptions, seeking meanwhile a more precise answer. Thus, we hope shortly to proceed with a three-year federally financed study of all aspects of the dental operatory in light of new demands and technology, relating these especially to the teaching process. The problem here is analogous to that of designing the cockpit space in a modern aircraft, for to do that the total design with all its interacting components, must be understood.

BITS AND PIECES

Meanwhile, as in other areas, the bits and pieces have to be put together in the best way possible. One repository is the catchall "unit program," a device already in extensive use in the institutional field. These unit programs represent the many proposed functional elements in their smallest components: a nursing unit, an outpatient clinic prototype, a multidiscipline laboratory, an operating suite with its minimal required elements.

These units can then be used in multiples, easily added to or subtracted as the long-range program is shaken down. This device, however, is limited and somewhat at variance with a consistently holistic or gestalt approach.

Projections. By applying the objectives to the guidelines provided by the four contexts, the planner should be in a position to make tentative volume assumptions in some key growth indexes within specified time increments. These will give the first gross summary of the actual intended growth, spelled out in proposed loading of medical systems in terms of people in comparison with the present and past. For example, this involves the number of beds and what kind, of ambulant visits and what kind, of student enrollments and what kind, right down to the much more fluid load areas of staff, personnel, procedures, supply, parked vehicles, public transit passengers, and so forth as required.

Long-range development plan. As the diagram shows, the first round of the informational base has for better or worse been completed, and on it a preliminary outline of the hospital's proposed long-range development program can be developed. The most convenient form in which to present this is a kind of summary report backed up by more detailed appendixes. In most institutions, this outline will consist of proposals for staged modernization from both the operational and facilities standpoint, combining a continual phasing out of the most obsolete plant, the remodeling of usable plant, and the introduction of new plant in areas of highest priority and change. In our planning at the Tufts-New England Medical Center, we are using a 20-year program period which for calculating purposes was divided arbitrarily into five-year increments. The final timing cycle will of course be related to funding and operational considerations and in our case has led to a front loading with a major initial push followed by a slower pace and smaller increments. The program also ranges from the quite specific directives related to immediate needs in the initial period to an ever more general and open-ended statement as the other end



(LEFT) SITUATED in the heart of downtown Boston, Tufts-New England Medical Center is locked in an urban web of pressures and flux. As part of the strategy for the center's modernization and development, planners have developed programs of active neighborhood involvement.

(BELOW) PLANNERS at Tufts-New England Medical Center use this large, three-dimensional model of their development area and its surrounding downtown neighborhood. Every existing structure is represented in scale and can be removed for various planning schemes as they are studied. This scheme, which represents an early study, has been subject to continued refinements.

of the total development period is approached.

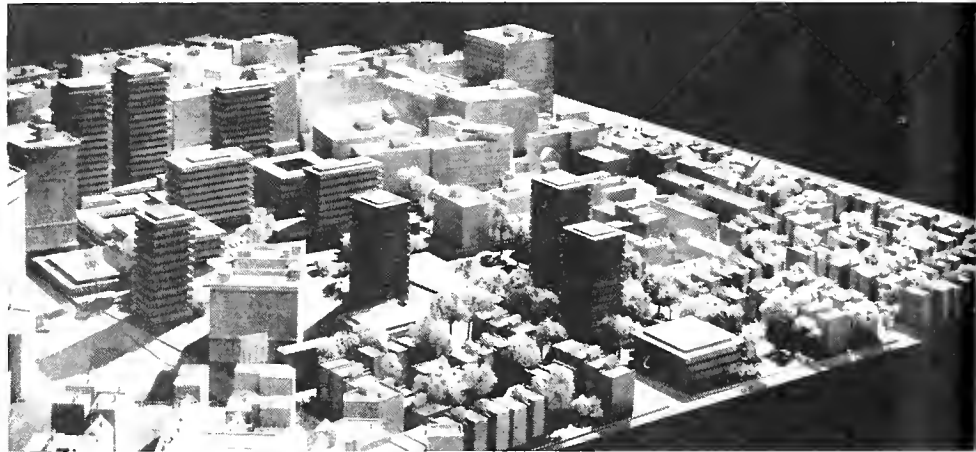
FOUR DISTINCT PARTS

In our preliminary planning report in Boston, the section relating directly to institutional growth consists of four distinct parts:

1. Summaries of required floor areas
2. Outline for a capital development program
3. Outline for a facilities program
4. Site considerations and spatial design

Each is presented in both a 20-year total and the incremental pieces leading to it. The actual tables are preceded by considerable explanatory text on objectives, general methodology, yardsticks, and volume assumptions. Now for a few words on each of the four major sections:

Area summaries. This is a quantitative listing in square feet of all functional elements, grouped under four major headings: education and research, hospital services, ambulant patient services, and medical center services. Six columns of figures accompany this listing. In the first column are listed the existing net square footage under each of those headings. In the next four columns are the incremental additions in square feet proposed for each five-year period, and in the final column is a total of the



final square footage to be achieved at the end of the 20-year period. Parentheses are placed around figures for additive space that is to be remodeled rather than newly constructed. More detailed back-up tables show this information for each separate stage and include interpolations giving estimated gross square footages and costs.

Capital development program. From the area summary material, cost summary tables were made for each stage and the 20-year total stated in 1965 cost levels and at levels adjusted for each stage to anticipated cost increases. (In this connection, attention should be directed to the excellent study made by James J. Souder.⁵ It was a most useful guide in cost estimating and much more sophisticated than other standards we have come across.) The price tags indicated in this section of the program

should in the finally approved policy document closely approximate the institution's funding capacity. To the degree that financial analysis has paralleled the planning effort and has been included in the constraints, the development report is likely to be on target. Unfortunately, one of the most difficult things is to get an institution to start early investigation of this aspect. As a result, many otherwise commendable development plans have ended up in a dead storage file.

Facilities development program. This section has two parts: a descriptive summary for the whole 20-year period and a more detailed breakdown for each increment. In each case both organizational and volume changes are spelled out and their impact in new and remodeled facilities described. This includes an indication of the exact

strategy to be employed and the multiple effects of each move.

Site considerations and spatial design. Ultimately, this section will provide the physical master plan in its final form and in each stage. Its function will be to serve as the guide for specific architectural solutions. Initially, however, it may only present alternative possibilities, testing out the problems of site location in relation to program intent. This is the stage we have reached in our own planning, holding back quite consciously from a definitive solution. In fact, over the past three years we have set up successive hypothetical three-dimensional schemes to test out various aspects, refining our concept on each round. Our main tool for this has been a big working model of our development area and its surrounding downtown neighborhood. Every existing structure is represented in scale and can be removed for schemes under study. From all this preliminary material, our architects are now developing a final design concept.

From what has been described, you will note that our concern is always with the whole, not simply with additive fragments. This approach obviously cannot be carried out as a single line operation. Instead, we periodically pull everything together, take stock, and hopefully come closer to reality on each successive round. What we have is still only an improvisation. Certainly, it is too early to judge its ultimate effectiveness. But clearly we are at least more sensitive to the real complexities of our assignment. The specific aspects of the methodology will be explained in detail along with examples of concrete results in Part 2 of this article. ■

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IN CARRYING on long-range development planning as a continuing inhospital operation, all internal and external factors must be appraised and both the history and the future role of the institution taken into consideration. All the individual interacting goals of the hospital must be analyzed, but none of these must ever take precedence over the totality that gives them meaning. Only after such an analysis and appraisal has been made can a logical sequential planning path be mapped out. This was discussed in detail in part one of this article (see **HOSPITALS**, J.A.H.A., Nov. 1, 1965).

Before looking at the specific aspects of methodology, it should first be noted that it is not a matter of passive information-gathering, analysis, and recommendation, but a many-sided strategy of action and politics. The real stuff of planning involves active intervention by the planner, who acts as a kind of change agent forcing a confrontation with issues that otherwise would be denied or evaded. The mere rationale for change is in itself insufficient stimulus for internal response.

PLANNER AS CHANGE AGENT

Change cannot be dictated from outside. As a continuous inhospital operation, however, planning can become the catalyst that unlocks doors, pushes them ajar, and helps create the openings into the future. In the blighted, boxed-in location of Tufts-New England Medical Center, it was not enough to talk hopefully of creating stable, compatible surroundings. Nor was it of any use to wait for what an on-going urban renewal program might do about it. Rather, a long, drawn-out campaign had to be devised to get both the institution and the city into a series of actions that would make such a renewal project a certainty. This implied a willingness of the hospital to come down from the ivory tower and become directly involved in the Boston political scene. Following this course for the past three years, the medical center has now become a collaborator with the city on an active federal urban renewal project for our area.

An example of similar activity on the internal front is the up-

grading of our dental school operation, which suffered from a traditional second-class citizen status within the medical complex. It was often regarded as only a semi-professional service. This created a vicious circle that tended to lower quality. To the planning office, it was clear that an upgrading of dentistry in this teaching center was of crucial importance because of the great changes in the making in this profession and their potential impact on the medical care continuum. Preliminary planning discussions brought the issue of the dental school more and more to the fore. Then the head of the department of social dentistry, a young, planning-oriented, and dynamic individual, became dean of the school and as a result the whole process has now gone into high gear.

A series of studies of dental operations uncovered staggering deficiencies. An entire restructuring of dental education in the medical center is now in process. This plan visualizes consolidating the dental clinics, dental research, and all but the first year of dental education in a new dental health sciences center. This facility, already in preliminary design, will be situated in close proximity to the hospital ambulant and inpatient services, replacing the present space shared with the medical school basic sciences "across the road" in an essentially academic sector. Meanwhile, as a transitional measure, funds were found for remodeling the substandard undergraduate clinics on the basis of new concepts in clinical operations. Thus, an ideal experimental base has been provided for working out patterns for the long-term solution.*

As a result of this sequence of events, not only are far-reaching changes being considered that were not in the cards before, but the attitudes about dentistry and its place in the medical center are radically changing. In turn, morale has improved greatly not only among dental students and faculty,

*Also, in July 1965, a federal grant (USPHS DH 00035-01A1) became available for a two-year planning research study for the redesign of the dental operatory, with an interdisciplinary team consisting of the dental dean, a design engineer, a human factors psychologist, and the director of the medical center planning office.

but also among patients.

MULTIDISCIPLINE OPERATION

In the complex setting of a medical center, planning must be broadly based. The traditional approach of treating it simply as a line administrative function or, conversely, as an extension of normal architectural services tends to short-change both the architect and the institution. Our planning operation is based on staff resources involving city planning, urban design, architecture, institutional planning, the behavioral sciences, hospital administration and, of course, the medical sciences. The planning office staff is itself multidisciplinary and has active consulting links throughout the medical center.

A good example of this linkage was the staff selected under a three-year federally supported grant for the study (completed this month) of a new design concept for a children's hospital in a medical center setting.* Under the aegis of the Floating Hospital, but as part of our total planning effort, this study has been under the joint direction of the hospital's pediatrician-in-chief and the head of the medical center planning office. The key staff members have been a social anthropologist and an architectural designer, working closely together in a daily joint search. This core team of four, with the city-planner member of the planning office and the pediatric hospital administrator, have met regularly for two hours once a week throughout the project, thus constituting a unique interdisciplinary task force. As a result, the entire pediatric hospital, with participation of all levels of staff, became the project laboratory. It is no surprise, therefore, that the broadest experimentation in methodology has been possible here, and some quite significant results have been turned up.

A few examples will help to illustrate our approach. What came to be called "scramble" was developed both as an indexing system for easy retrieval of collected re-

search data and as an interviewing tool. Instead of asking set questions compiled by the planner, terms were gradually assembled that seemed to crop up in connection with the study of children in the hospital. Terms as diverse as "adolescent," "brace shop," "cuddle," "hematology," "mother," "referral," "sun" were gradually collected. These were put on cards and organized in a wall display. An interview with the doctor, nurse, or whomever it may have been started with the planner's pulling out the card relating to his or her service or specialty. This would then be matched successively with the other cards on the wall, with the person being interviewed asked to note any relationship of significance. A recording machine recorded the responses. This associative technique opened up unexpected and unexplored areas and brought out aspects that never would have come up otherwise. Interviews of this sort carried out through a cross section of the hospital produced not only a wealth of information, but also a clustering of concerns of direct relevance to the search for the key linkages in the hospital system. Relevant bits of these interviews as well as data from many other sources were then fed into a master research file, where they can easily be retrieved and analyzed.

A second tool is called the "people-machine/work system." Essentially it is a grid, a one-front wall display, that enables the planners to simulate certain limited interrelationships characteristic of a chosen hospital subsystem and then to modify these for desired changes in organization or in size. The information was gathered first by observing selected operations and then simulating four degrees of involvement between activities on the one hand and persons, machines, or equipment on the other. This was done by hanging colored disks on the nail grid on the wall. Alternative models could be studied by rearranging or adding activities, personnel, or both or by doubling the size of the operation, with a corresponding changed pattern of disks.

EXPERIMENTAL CONCEPTS

The importance of this kind of

tool should not be exaggerated. It has helped, however, in analyzing hospital relationships and the impact of changes in the organization and size of its subsystems. And this is done without the intrusion of spatial considerations as would be the case with the use of floor plans.

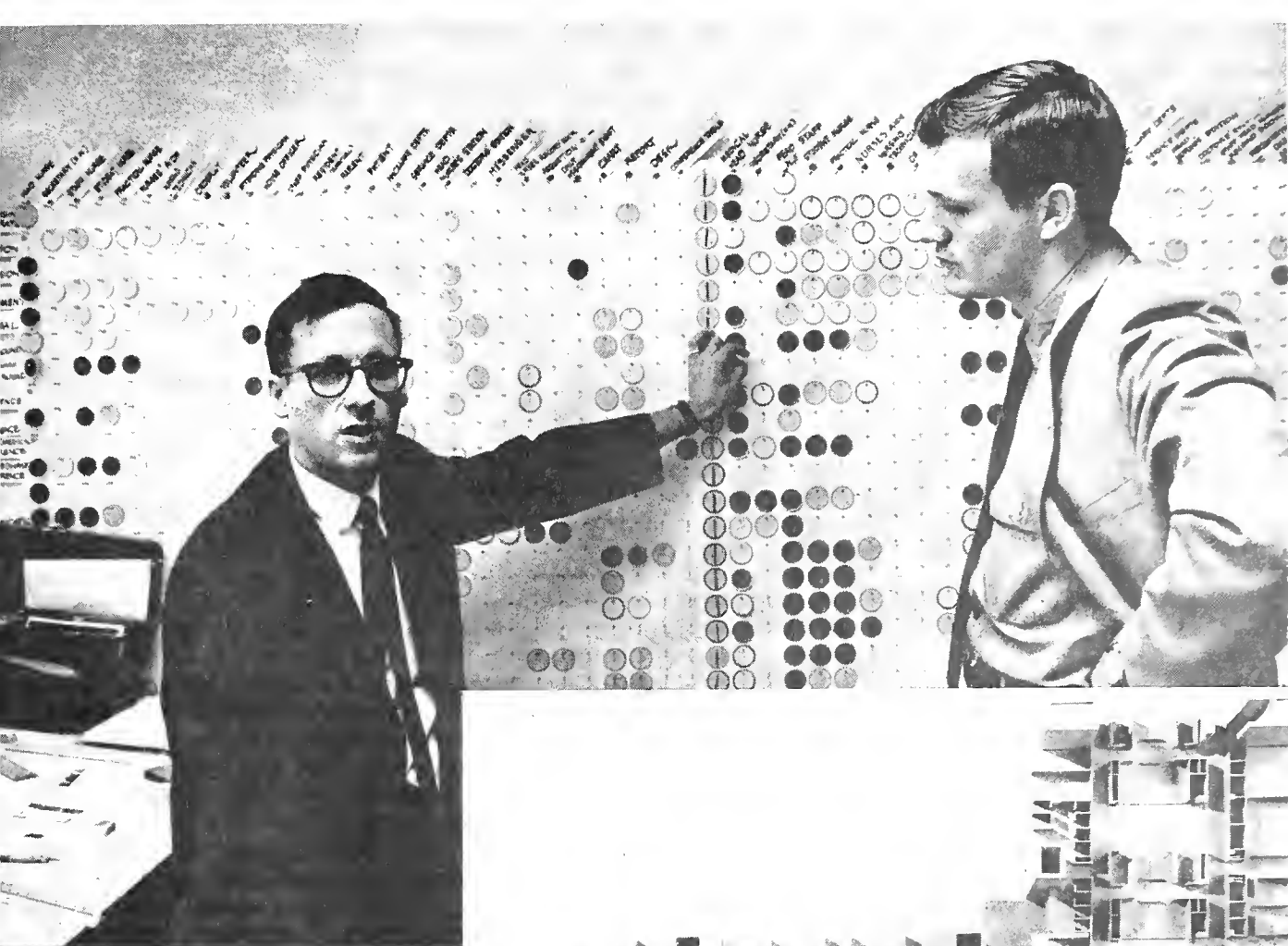
A logical progression from analysis and tinkering with systems is the emergence of experimental concepts. A concrete example of great relevance to the planning of new pediatric facilities is what we call the experimental "family participation unit."* A number of considerations converged to produce this solution: the problem of parental absence in a children's hospital, the mixed experience of so-called living-in to try to meet this problem, the opportunity for parental health education, the shortage of nursing personnel, the problem of cost, and others. In place of passive living-in by the parent, the planners decided to involve the mother directly and actively by having her in effect be the nurse of her own child just as if she and the child were at home, but with the nursing resources at hand as needed.

Because the planning operation is an integral part of the institution's activities, the hospital is able to serve as a laboratory for such experiments. In this case, an eight-room experimental unit has been set up on a separate floor with only a "nurse-educator" in the vicinity during the day and an intercom phone at night to the nursing floor below. The cost saving passed on to the patient amounts to a \$5 reduction per day for the room.

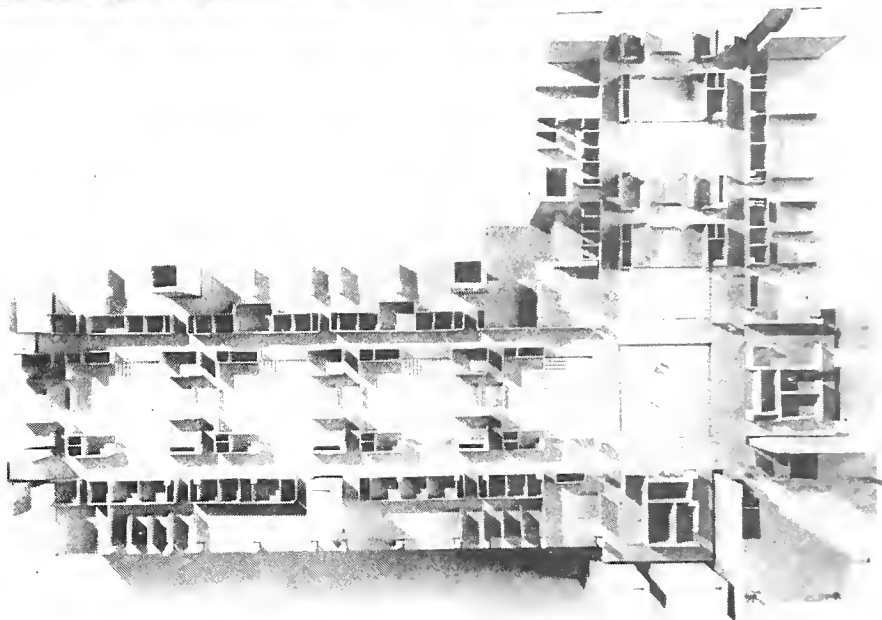
When the unit was opened over a year ago, it was visualized that the main users would be relatively well or semiambulant children. As it has turned out, about 85 per cent are surgical cases. Thus, the most enthusiastic supporter in the hospital is the chief pediatric surgeon, who has been sending young patients with routine surgery, such as hernia operations and appendectomies, right from the recovery room into their mother's care in the unit. The therapeutic and general psychological benefits for the child have been marked and re-

*USPHS Grant HM00235, "Study for New Design Concept for a Children's Hospital," Marshall Kreidberg, M.D., principal investigator; Herman H. Field, A.I.A., co-principal investigator; Donald A. Kennedy, Ph.D., Delbert Highlands, M. Arch., and Elliot P. Rothman, M.C.P., staff members.

*HOSPITAL, J.A.H.A., July 1, 1964, p. 38.



(ABOVE) MEMBERS of Tufts-New England Medical Center's planning staff demonstrate their systems circulation display panel, which enables them to simulate certain limited interrelations of a hospital subsystem. (RIGHT) THIS MODEL is being used by the planning office for study of a single pediatric nursing floor with six 10-bed acute-care clusters.



covery has been generally speeded up. Recently, the first child with cleft-palate surgery was admitted experimentally.

THE CLUSTER CONCEPT

Another interesting concept has emerged out of studies in the pediatric area. It is a continuous horizontal inpatient floor broken up into 10-bed clusters. This creates a more effective nursing setup in a scale that is more intimate. Furthermore, it avoids the usual fragmentation by specialty beds with its effect on bed census, and it allows for easy shifting of desired separations, depending directly on specific bed needs. Because of the pressures of our inner-urban site, we have worked out a double-floor concept. Even so, it is a radical departure from the usual arrangement of bed facilities, and

is being introduced by the medical center architects into the preliminary design for the new pediatric facility. A modification involving 90-bed floors decentralized into 15-bed clusters is also under study for the medical center's projected new adult inpatient floors.

CONTIGUITY AND CONCENTRATION

The horizontal emphasis in the pediatric inpatient concept touches on one of the most complicated problems in hospital planning, especially in a large teaching complex. It is the matter of contiguity, and close behind it, that of centralization versus dispersion. Unlike the campus university, whose

elements require little, if any, all-weather connections and relatively unsophisticated people-materials movement systems, a medical care facility tends toward a clustering about the center, with everything seeking to be adjacent to or on top of everything else. This is easy to accomplish when dealing with an eight-bed hospital on an island, but the more extensive and complex the operation is, the more difficult it is to achieve such contiguity and the more destructive the side effects on growth, flexibility, and human scale.

Most planners who have studied the problem will agree that the single-floor institution that can

keep on creeping out in every direction has many advantages. But one begins to wonder if ultimately the flexibility and ease of horizontal movement will be offset by too great a dispersion and with it a confusion of relationships over extended distances. Certainly in a big urban teaching complex such horizontality is impractical and in fact self-defeating.

This means that a closer look must be taken at the concept of contiguity. There are in fact two types of contiguity: horizontal and vertical. Like elements can be stacked on top of one another instead of putting them side by side. In most situations like ours in Boston, both types of contiguity are used in combination. This calls for major design decisions on just where the emphasis should be horizontal and where vertical. One factor is that in spite of elevators and escalators, people relate their activities more easily to one another horizontally. On the other hand, to date our mechanical materials-movement systems seem to work more efficiently vertically than horizontally, and poorest when combined. The decision as to which relationships to place in horizontal contiguity and which in vertical will have a major impact on the whole philosophy as well as the operational concepts of the institution. This can be illustrated by theoretically posing two opposite approaches.

TWO OPPOSITE APPROACHES

In one approach, all functional components of any one specialty or service—say neurosurgery—would be placed horizontally adjacent. These would consist of inpatient areas, the clinical research unit, outpatient clinics, clinical laboratories, research laboratories, and perhaps even facilities for x-ray and surgery. The floor above would be arranged similarly for general medicine, and others for otolaryngology, mental health, and so forth. In effect, this plan also would do something else. It would create subsidiary vertical contiguities for the various functional subdivisions, that is, all nursing floors would be stacked over one another, perhaps even in the form of a wing; so would the various pieces of outpatient service, the research labo-

ratories, maybe even the operating suites and x-ray sections.

In the opposite approach, all the functional areas irrespective of specialty would be placed in horizontal layers; that is, all outpatient clinics would be on one floor, all inpatient beds on one or more adjacent floors. Other floors would be for the operating suites only, or exclusively for x-ray, clinical research units, or clinical laboratories. Again, a subsidiary vertical contiguity would also be created. This time it would be of functional components of the specialty itself. Everything dealing with mental health would be stacked vertically, as it also would be for general medicine, and so forth. In effect, this approach gives priority to proximity of *all* beds, *all* ambulant functions, *all* surgery, and so forth, and a subordinate vertical emphasis to the medical specialties contained within each.

USUALLY A MIX

As can be seen, the choice of approach will be felt in every aspect of the institution's operations. The first alternative obviously emphasizes the medical specialties and tends toward empire building, with its negative effect on coordinate unit function of the hospital. The second does the opposite, mixing patients much more broadly and allowing for a more flexible use of beds and outpatient examining and treatment facilities. The choice is likely to have a considerable impact on bed census. Traditionally, hospitals tend to have mixes in various combinations. The bed tower with its several-story pad of outpatient clinics, operating suites, x-ray department, and other ancillary functions is just such a mix, with the beds treated vertically by specialties and the rest horizontally by function. Of course, in a teaching center, the requirements for proximity of research and teaching space further complicate things.

This matter of contiguity ties in directly with that of centralization and dispersion. The trend in recent decades has been toward centralization. The growing size and technological emphasis of hospitals, along with land pressure, doubtlessly have been factors. This trend in its extreme all-in-one-package

form has many strikes against it. One major one is that it just does not lend itself to gradual and shifting incremental growth with open-ended long-term goals, nor to the unevenness of such growth in the various areas. Also, in its overwhelming scale, it de-emphasizes the human goal and neighborhood continuity.

SNOWBALLING INVOLVEMENT

The methodology in a slightly different area deserves mention, too. That concerns the medical center and its neighborhood, the turning of what was initially regarded as a negative happenstance into a constructive asset for the future. The Tufts-New England Medical Center is boxed in at present in a badly blighted corner of downtown Boston, a setting that is quite incompatible with its medical care-education-research objectives. The temptation to give up and move to greener pastures gave way to the more practical solution of trying to make the best of whatever assistance could be obtained through urban renewal action. After this first step was taken, other steps followed, and with them a re-evaluation of the implications of this course. Having decided to stay and change the neighborhood, the planners gradually discovered that the location actually had a singular potential, especially if the medical center's future was examined in relation to general health care trends. It was situated exactly at the focal point of an emerging metropolitan and regional highway system; the same was true with regard to the public transit system. There existed a unique opportunity to integrate institutional and neighborhood growth, to make use of the revitalized commercial life of the downtown area, to relate inservice functions and teaching to expanded intown populations and their unmet health needs, and to draw upon housing within walking distance of the institution.

After promoting and sponsoring an urban renewal project for our area and initiating planning studies for it, the medical center developed further collaborative links in other directions. One was with the public transit agency in regard to removal of an elevated line bisecting our development area and relocating it

underground. With it came the possibility of building a new station with direct access to the medical center's future admission area and oriented in its design toward patients and older handicapped persons.

Another area of collaboration was with the public school system in planning for a new grade school to be part of a proposed residential belt around the center. The school would be under the educational sponsorship of the Tufts department of education and would include special programs for emotionally disturbed and physically handicapped children linked to the hospital's pediatric service.

Further explorations have included the local public housing authority and other agencies in working toward the inclusion of varied types of housing for older people that would be related directly to our geriatric medical facilities. Another link was developed with the YMCA to explore the possibility of expanding a presently quite inadequate facility, used by the Chinese ethnic community, into an entirely new recreational and community center for the entire neighborhood, including the medical center. These are but a few examples of a snowballing involvement that could greatly benefit both the future institution and its urban neighborhood.

MATTER OF DESIGN

The matter of design has been left for last, not from a wish to de-emphasize it; on the contrary, it was intended that this aspect of planning be treated as a kind of summation of everything we are trying to achieve at the medical center. Normally, design still tends to be treated as something additive, something to be done when everything else is resolved. With the usual preoccupation with technical aspects, refinements in patient floor layouts, supply systems, specialized utilities, and all the latest hospital hardware, overall design quality ends up pretty low on the totem pole. In fact, there is an inclination—even among architects—to shrug and say: "There is not much you can do, little leeway left. The modern hospital is more machine than architecture anyway."

I disagree emphatically. This attitude is characteristic of the present transition, of the overinfatuation with technology and science as an end rather than with the human being it is supposed to serve. The faceless sameness of hospitals across the country is a reflection of the superficiality with which the newly found know-how has been applied. The many-sidedness of human demands within and around the hospital of the future is the antithesis of the standardized package and is a rich source for

creative design. In its deepest sense.

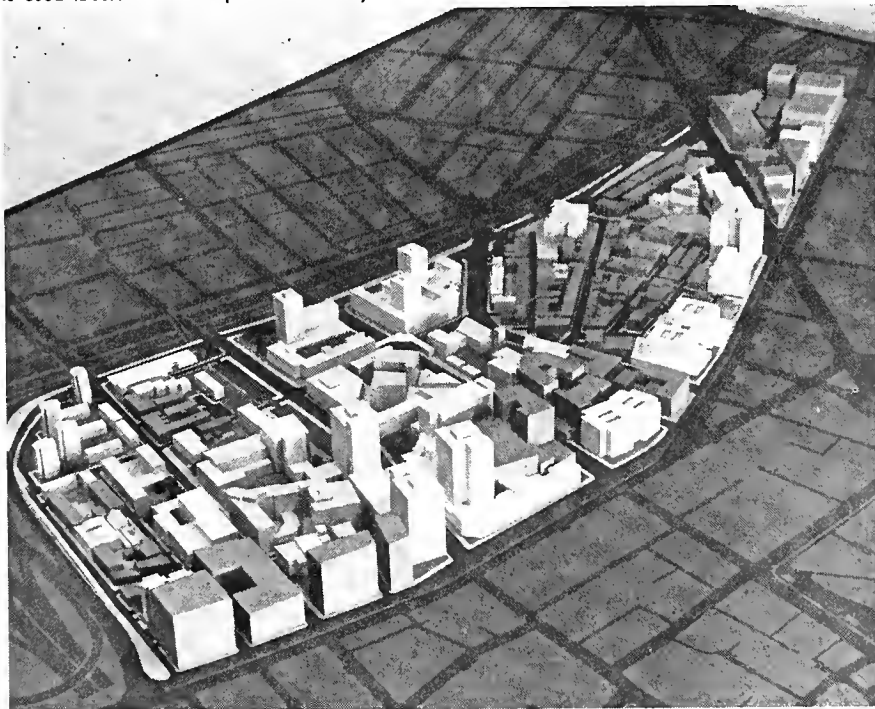
With us the design factor has been deeply embedded at every stage of thinking, in control of the technology as a synthesizer rather than as a prettifier. From the first day in our planning at the Tufts-New England Medical Center, this has been going on at many levels: at the level of the larger urban design implications of Boston, at the level of our particular section of it, at the various scales represented by the diverse neighborhood and by inner institutional relationships. It has also been an indispensable guide at every point in giving constructive form to continual change and growth of the institution, both in its outward centrifugal push and its inward reuse consolidation.

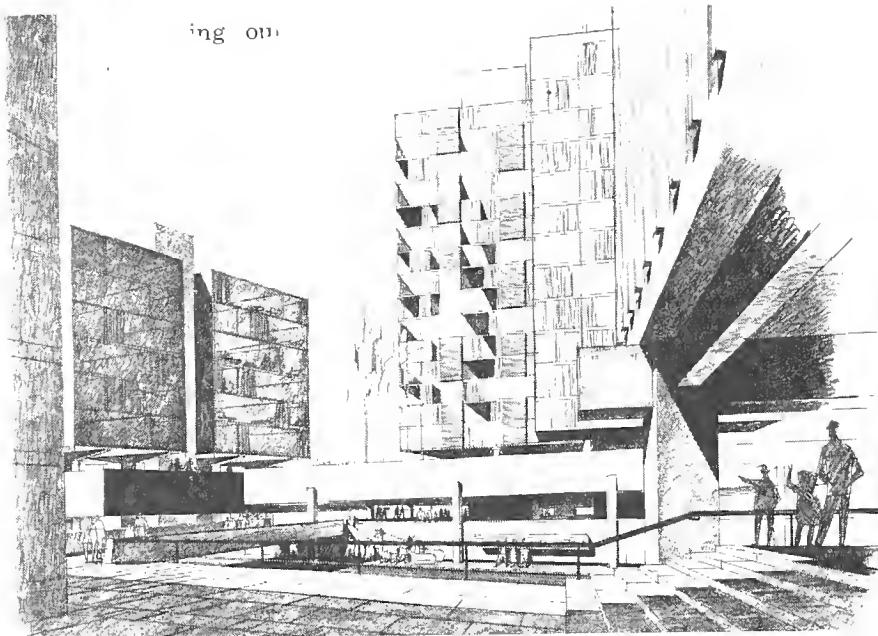
One of the most obvious violations in design is the usual disregard by the hospital of its surrounding area. Few building types have so consistently developed at variance with everything around them, sometimes even to the extent of becoming a major cause of the neighborhood's fall into blight. In its future role, the health institution cannot tolerate this paradox, nor the frightful waste in lost opportunity this represents. In contrast to this, our planners hope to make the medical center a visible symbol of a new urban cohesiveness and exemplary quality of living. As one example, there is the concept of raising the medical activities above the street level and letting the revitalized life of our neighborhood—its stores, restaurants, and general mixing of people—flow underneath and through, breaking down the traditional barriers between the so-called sick and the so-called well.

SELECTING THE ARCHITECT

But how, you may ask, can this approach in overall planning be translated into an architectural expression that will ultimately possess the quality being sought? It is an all-too-familiar occurrence that promising planning preparations end up in disappointingly mediocre facilities. Perhaps one key lies partly in a more intelligent method of selecting the architect than is usual among institutions. All too often either the closed shop, based on sticking to the "good old firm," or reliance on the

PLANNING OFFICE activities involve its planners in external renewal projects for its crowded surrounding urban environment. For the South Cove Urban Renewal Project, this study model is used (Boston Redevelopment Authority).





DETAIL OF PROPOSED medical center plaza illustrates the concept of elevating center above street level to allow neighborhood activities to flow through and underneath it.

happenstance of particular past trustee-architect associations still holds sway. The second key appears to lie in the manner of phasing the architect into an inhospitable planning process at the best moment to assure the most productive collaboration. Both these things have been attempted at Tufts-New England. Although it is too early to know whether in fact these procedures will produce what is hoped for, it might be worth mentioning how we went about selecting our architect.

The first step was the decision to make a fresh start based closely on our overall planning approach. The selection procedure narrowed down to two choices: (a) a closed invitational competition or the variant of this in a two-stage, open-closed competition, the second stage narrowed to some five finalists, with the winner selected by a jury, or (b) direct selection by the trustees from a small number of candidates recommended by a consultant panel of outstanding professional advisers.

The second approach was decided on, out of a feeling that a competition could not do justice to the complexity of the problem, for it would put emphasis by necessity on superficiality of judgment and solution. The key factors in our case appeared to be the statement of criteria and the quality of judgment of our panel.

SELECTION CRITERIA

The criteria on which our search for an architect were based can be summarized briefly in order of importance:

1. Outstanding architectural design ability.
2. Proven competence and sensitivity to urban design; that is, seeing the medical center as the form-giver for its area and a symbol of the institutional sector of the "new Boston."
3. Sympathy toward and familiarity with working on a collaborative planning approach.
4. Sense of responsibility to client—not a self-assertive prima donna. Seeing the future plant of the medical center as an expression of the human purposes it houses.
5. Reasonable geographic accessibility for continuing interchange in the planning process.
6. Ability to handle a project of this size.
7. Previous experience with incremental building with new and old structures in a constantly shifting pattern.
8. Willingness of the selected principal of the firm to be directly responsible for design.

The criteria did not specifically include previous hospital experience. Wouldn't it have been logical to seek a hospital architect? We thought not. Our own inhospitable planning operation has this capacity in a general way, and for special

technical problems, it or the architects could always turn to specific consultants who would remain just that and no more. Experience has shown that only rarely will the specialist architect also be the most creative designer with a broad, unencumbered view. At this point, it should be mentioned that Boston is fortunate in having a highly professional public agency, the Boston Redevelopment Authority, which has a similar commitment to good design and a concern with it at all levels.

CONCLUSION

The approach we have taken is anything but simple and is vulnerable to political cross currents that may narrow the ultimate achievement. In our own case, planning with the city and its agencies has gone on in a more favorable climate than within the institution itself, where overall progress has been impeded, except in the pediatric and dental areas, by a number of internal difficulties.

Furthermore, in the form outlined, such planning is likely to be quite beyond the capacity of the smaller institution. However, there are a number of ways to achieve the general intent, provided that the problem is treated with the breadth and understanding it deserves. In Sweden, for instance, a kind of research-and-planning pool in the hospital field has been set up by a number of contributing architectural firms, and this resource is available to any of the participants. In any case, it is important to think big, not so much in a quantitative sense as in a qualitative one. No matter how much effort is given to this objective, it will not be enough, since we who are planning for the future are captives of the past. We were trained in one era, but must anticipate attitudes, aspirations, and needs of a radically different one ahead. In a way, it is an impossible assignment, but it must be given at least the best we have. ■

